

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Thomas W. Kenny et al.

Serial No.: 10/669,495

Filed: September 23, 2003

MICRO-FABRICATED For:

ELECTROKINETIC PUMP WITH

ON-FRIT ELECTRODE

Group Art Unit: 3746

Examiner:

TRANSMITTAL LETTER

162 N. Wolfe Road Sunnyvale, CA 94086 (408) 530-9700

Customer No.: 28960

Commissioner for Patents P.O. Box 1450

Alexandria, VA 22313

Sir:

Enclosed please find an Information Disclosure Statement and Form PTO-1449, including copies of the references contained thereon, for filing in the U.S. Patent and Trademark Office.

You will also find enclosed the associated Transmittals, Electronic Information Disclosure Statements, and United States Patent and Trademark Office Acknowledgment Receipts for the electronically filed Information Disclosure Statement (EFS ID #57861); (EFS ID #57862); (EFS ID #57863); and (EFS ID #57864) filed on March 25, 2004.

The Commissioner is hereby authorized to charge any additional fee or credit overpayment to our Deposit Account No. 08-1275. An originally executed duplicate of this transmittal is enclosed for this purpose.

> Respectfully submitted, HAVERSTOCK & OWENS LLP

Dated: 3-26-04

Reg. No.: 32,571

Attorneys for Applicants

CERTIFICATE OF MAILING (37 CFR§ 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

HAVERSTOCK & OWENS LLP.

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UNITED STATES PATENT AND TRADEMARK OFFICE ACKNOWLEDGEMENT RECEIPT

Electronic Version 1.1 Stylesheet Version v1.1.1

Title of Invention	MICRO-FABRIC	ATED ELECTROKINETIC PUMP WITH ON-FRIT ELECTRODE			
Submission Type:	Information (Disclosure Statement			
Application Number:	10/669495	*10/669495*			
EFS ID:	57862				
Server Response:	Confirmation Code	Message			
	ISVR1	Submission was successfully submitted – Even if Informational or Warning Messages appear below, please do not resubmit this application			
	ICON1	3987			
	ISYS5	Filename= N/A BusinessRule= Validation System/Function Call Information. #Supporting Msg:Server unable to validate the Confirmaton/Application numbers at this time. They will be checked by PTO personnel later.			
First Named Applicant:	Thomas Kenr	ny			
Attorney Docket Number	:				
Timestamp:	2004-03-25	2004-03-25 14:17:22 EDT			
From:	us				
File Listing:					

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Digital Certificate Holder cn=Thomas B. Haverstock,ou=Registered Attorneys,ou=Patent and Trademark

Name:

Office,ou=Department of Commerce,o=U.S. Government,c=US

Page 2 of 2

Page 1 of 2

Transmittal

Electronic Version v1.1

TRANSMITTAL

Stylesheet Version v1.1.0

MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT ELECTRODE Invention Title of

10/669495 10/669495 Application Number:

2003-09-23

Thomas W. Kenny First Named Applicant: Date:

Confirmation Number: 3987

Attorney Docket Number:

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submitted to the United States Patent and Trademark Office, using either the USPTO provided prosecution of a patent application noted in the submission. This document(s) will become I, the undersigned, certify that I have viewed a display of document(s) being electronically style sheet or software, and that this is the document(s) I intend for initiation or further part of the official electronic record at the USPTO.

Submitted by:	Elec. Sign.	Sign. Capacity
homas B. Haverstock	/tbh/	
Registered Number: 32571		Attorney

Documents being submitted	Files
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10/669495

ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18

Stylesheet Version v18.0

Title of

MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT

ELECTRODE Invention

10/669495 Application Number: Confirmation Number: 3987 First Named Applicant: Thomas Kenny

Attorney Docket Number:

Search string:

(5383340 or 5421943 or 5427174 or 5436793 or 5459099 or 5508234 or 5514832 or 5514906 or 5544696 or 5548605 or 5575929 or 5579828 or 5585069 or 5459099 or 5641400 or S692558 or S696405 or \$703536 or \$704416 or \$727618 or \$759014 or \$763951 or \$774779 or \$800690 or \$801442 or 5835345 or 5836750 or 5858188 or 5863708 or 5869004 or 5870823 or 5874795 or 5876655 or 5880017 or 5880524 or 5901037 or 5936192 or 5940270 or 5942093 or 5964092 or 5965001 or 5965813 or 5978220 or 5997713 or 5998240 or 6007309 or 6010316 or 6013164 or 6019882 or 6054034).pn.

US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

init	Cite.No.	Patent No.	Date	Patentee	KInd	Class	Subclass
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	2	5421943	1995-06-06	Tam et al.	1		
	3	5427174	1995-06-27	Lomolino, Sr. et al.	7		
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	5	5459099	1995-10-17	Hsu	7		
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Page 3 of 3

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Signature

Examiner Name	Date

Page 1 of 2 Acknowledgement Receipt

UNITED STATES PATENT AND TRADEMARK OFFICE ACKNOWLEDGEMENT RECEIPT

Electronic Version 1.1 Stylesheet Version v1.1.1

Title of Invention	MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT ELECTRODE				
Submission Type:	Information (Disclosure Statement			
Application Number:	10/669495	*10/669495*			
EFS ID:	57863				
Server Response:	Confirmation Code	Message			
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	ICON1	3987			
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First Named Applicant:	Thomas Kenr	ny			
Attorney Docket Number:					
Timestamp:	2004-03-25	2004-03-25 14:19:16 EDT			
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Name:

Office,ou=Department of Commerce,o=U.S. Government,c=US

Transmittal

TRANSMITTAL Stylesheet Version v1.1.0 Electronic Version v1.1

10/669495 10/669495 Application Number:

2003-09-23

Thomas W. Kenny First Named Applicant:

Confirmation Number: 3987

Attorney Docket Number:

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submitted to the United States Patent and Trademark Office, using either the USPTO provided prosecution of a patent application noted in the submission. This document(s) will become I, the undersigned, certify that I have viewed a display of document(s) being electronically style sheet or software, and that this is the document(s) I intend for initiation or further part of the official electronic record at the USPTO.

Submitted by:	Elec. Sign.	Sign. Capacity
Thomas B. Haverstock	/tbh/	
Registered Number: 32571		Attorney

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ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18

Stylesheet Version v18.0

MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT Title of Invention **ELECTRODE**

10/669495 Application Number: Confirmation Number: First Named Applicant: Thomas Kenny

Attorney Docket Number:

Search string:

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US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

nit	Cite.No.	Patent No.	Date	Patentee	Kind	Class	Subclass
٦ì	1	6068752	2000-05-30	Dubrow et al.	7		
\neg	2	6090251	2000-07-18	Sundberg et al.	i		
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Information Disclosure Statement

Page 3 of 3

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Signature

Examiner Name	Date

Alajoki et al.

Page 1 of 2 Acknowledgement Receipt

UNITED STATES PATENT AND TRADEMARK OFFICE ACKNOWLEDGEMENT RECEIPT

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Application Number:	10/669495	*10/669495*
EFS ID:	57864	
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First Named Applicant:	Thomas Keni	ny
Attorney Docket Numbe	r:	
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File Listing:		

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Digital Certificate Holder cn=Thomas B. Haverstock,ou=Registered Attorneys,ou=Patent and Trademark

Name:

Office,ou=Department of Commerce,o=U.S. Government,c=US

Page 2 of 2

Electronic Version v1.1

Transmittal

Stylesheet Version v1.1.0

TRANSMITTAL

MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT ELECTRODE Title of Invention

10/669495 10/669495 Application Number:

2003-09-23 Date:

Thomas W. Kenny First Named Applicant:

Confirmation Number: 3987

Attorney Docket Number:

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Submitted by:	Elec. Sign.	Sign. Capacity
homas B. Haverstock	/tbh/	
egistered Number: 32571		Attorney

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ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18 Stylesheet Version v18.0

> MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT Title of ELECTRODE Invention

10/669495 Application Number: Confirmation Number: 3987

10/669495

First Named Applicant: Thomas Kenny Attorney Docket Number:

Search string:

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20010044155 or 20010045270 or 20010046703 or 20010055714 or 20020011330 or 200200134543).pn.

US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

init	Cite.No.	Patent No.	Date	Patentee	Kind	Class	Subclass
	1	6591625	2003-07-15	Simon	В1		
	2	6632655	2003-10-14	Mehta et al.	В١		

US Published Applications

Note: Applicant is not required to submit a paper copy of cited US Published Applications

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	1	20010016985	2001-08-30	Insley et al.	A1		
	2	20010024820	2001-09-27	Mastromatteo et al.	Αl		
	3	20010044155	2001-11-22	Paul et al.	Al		
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	5	20010046703	2001-11-29	Burns et al.	Al	Ì	
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7	20020011330	2002-01-31	insley et al.	Al	
8	20020134543	2002-09-26	Estes et al.	AI	
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Submission Type:	Information D	Disclosure Statement
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First Named Applicant:	Thomas Kenr	ny
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Name:

Office,ou=Department of Commerce,o=U.S. Government,c=US

Page 1 of 2

Transmittal

TRANSMITTAL Stylesheet Version v1.1.0 Electronic Version v1.1

Title of	MICRO-FARRICATED ELECTROKINETIC PLIMP WITH ON-ERIT ELECTRODE
Invention	

10/669495 10/669495 Application Number:

2003-09-23

Date:

Thomas W. Kenny First Named Applicant:

Confirmation Number: 3987

Attorney Docket Number:

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Submitted by:	Elec. Sign.	Sign. Capacity
Thomas B. Haverstock	/tbh/	
Registered Number: 32571		Attorney

Documents being submitted	Files
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ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18 Stylesheet Version v18.0

> MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT Title of Invention **ELECTRODE**

10/669495 Application Number: 3987 Confirmation Number: First Named Applicant: Thomas Kenny

Attorney Docket Number:

Search string:

(3654988 or 3817321 or 3823572 or 3923426 or 3929154 or 4109707 or 4194559 or 4248295 or 4138996 or 4312012 or 4540115 or 4450472 or 4485429 or 4516632 or 4561040 or 4567505 or 4573067 ar 4664181 or 4758926 or 4866570 or 4868712 or 4894709 or 4896719 or 4908112 or 4938280 or 5009760 or 5016138 or 5057908 or 5058627 or 5070040 or 5083194 or 5088005 or 5096388 or 5099311 or 5099910 or 5125451 or \$131233 or 5203401 or \$218515 or 5219278 or 5232047 or 5239200 or 5263251 or 5274920 or 5308429 or

5309319 or 5317805 or 5325265 or 5336062 or 5380956).pn.

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Examiner Name	Date



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Group Art Unit: 3746
Thomas W. Kenny et al.	Examiner:
Serial No.: 10/669,495))) SUPPLEMENTAL INFORMATION
Filed: September 23, 2003	DISCLOSURE STATEMENT
For: MICRO-FABRICATED ELECTROKINETIC PUMP WITH ON-FRIT ELECTRODE)) 162 N. Wolfe Road) Sunnyvale, CA 94086) (408) 530-9700

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313

Sir:

The citations listed below, copies attached, may be material to the examination of the above-identified application, and are therefore submitted in compliance with the duty of disclosure defined in 37 C.F.R. §§ 1.56 and 1.97. The Examiner is requested to make these citations of official record in this application.

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This Supplemental Information Disclosure Statement under 37 C.F.R. §§ 1.56 and 1.97 is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that anyone or more of these citations constitutes prior art.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

Dated: 3-26-04

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Attorneys for Applicants

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Sheet 1 of 7 U.S. Department of Co Patent and Trademark of Co Patent and Trademark of Co Patent and Trademark of Co (Use Several Species If Necessary) § 1.98(b)) FORM PTO-1449 U.S. Department of Commerce Patent and Trademark Office Serial No.: 10/669,495 Attorney Docket No.: COOL-00700 (Modified) Applicants: Thomas W. Kenny et al. Group Art Unit: 3746 Filing Date: September 23, 2003 (37 CFR § 1.98(b)) FOREIGN PATENTS OR PUBLISHED FOREIGN PATENT APPLICATIONS Translation Document **Publication Date** Country / Patent Office Class Subclass Number Yes No 03/04/97 BO1D 61/42 X CN AA 97212126.9 H01L 21/50 Х AB 🗸 2000-277540 10/06/00 JP OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication) Stephen C. Jacobson et al., "Fused Quartz Substrates for Microchip Electrophoresis", Analytical Chemistry, Vo. 67, No. 13, July 1, 1995, pages 2059-2063. AC AD Kendra V. Sharp et al., "Liquid Flows in Microchannels", 2002, Vol. 6, pages 6-1 to 6-38. Shuchi Shoji et al., "Microflow devices and systems", J. Microcech. Microeng. 4 (1994), pages 157-171, printed in the U.K. ΑE Angela Rasmussen et al., "Fabrication Techniques to Realize CMOS-Compatible Microfluidic Microchannels", Journal of Microelectromechanical, Vo. 10, No. 2, June 2001, pages 286-297. AF J. H. Wang et al., "Thermal-Hydraulic Characteristic of Micro Heat Exchangers", 1991, DSC-Vol. 32, Micromechanical Sensors, Actuators, and Systems, pages 331-339. AG Gad Hetsroni et al., "Nonuniform Temperature Distribution in Electronic Devices Cooled by Flow in Parallel Microchannels", IEEE Transactions on Components and Packaging Technologies, March 2001, Vol. 24, No. 1, pages 16-23. AH X. F. Peng et al., "Heat Transfer Characteristics of Water Flowing through Microchannels", Experimental Heat Transfer An International Journal, Vol. 7, No. 4, October-December 1994, pages 265-283. ΑI Linan Jiang et al., "Forced Convection Boiling in a Microchannel Heat Sink", Journal of Microelectromechanical Systems, Vol. 10, No. 1, March 2001, pages 80-87. AJ 🗸 Muhammad M. Rahman et al., "Experimental Measurements of Fluid Flow and Heat Transfer in Microchannel Cooling Passages in a Chip Substrate", 1993, EEP-Vol. 4-2, Advances in Electronic Packages, pages 685-692. ΑK X. F. Peng et al., "Forced convection and flow boiling heat transfer for liquid flowing through Microchannels", 1993, Int. J. Heat Mass Transfer, Vol. 36, No. 14, pages 3421-3427. ΑL Lung-Jieh Yang et al., "A Micro Fluidic System of Micro Channels with On-Site Sensors by Silicon Bulk Micromaching", September 1999, Microfluidic Devices and Systems II, Vol. 3877, pages 267-272. AM G. Mohjuddin Mala et al., "Heat transfer and fluid flow in microchannels", 1997, Int. J. Mass transfer, Vol. 40, No. 13, pages 3079-3088, AN J. M. Cuta et al., "Fabrication and Testing of Micro-Channel Heat Exchangers", SPIE Microlithography and Metrology in Micromaching, Vol. 2640, 1995, pages 152-160. AO Linan Jiang et al., "A Micro-Channel Heat Sink with Integrated Temperature Sensors for Phase Transition Study", 1999, 12th IEEE International Conference on Micro Electro Mechanical Systems, pages 159-164. AP ! Linan Jiang et al., "Fabrication and characterization of a microsystem for a micro-scale heat transfer study", J. Micromech. Microeng. 9 (1999) pages 422-428, printed in the U.K. AQ M. B. Bowers et al., "High flux boiling in low flow rate, low pressure drop mini-channel and micro-channel heat sinks", 1994, Int. J. Heat Mass Transfer, Vol. 37, No. 2, pages 321-332. AR Yongendra Joshi, "Heat out of small packages", December 2001, Mechanical Engineer, pages 56-58. AS A. Rostami et al., "Liquid Flow and Heat Transfer in Microchannels: a Review", 2000, Heat and Technology, Vol. 18, No. 2, pages 59-68. ΑT Lian Zhang et al., "Measurements and Modeling of Two-Phase Flow in Microchannels with Nearly Constant Heat Flux Boundary Conditions", Journal of Microelectromechanical Systems, Vol.11, No. 1, February 2002, pages 12-19. AU Muhammad Mustafizur Rahman, "Measurements of Heat Transfer in Microchannel Heat Sinks", Int. Comm. Heat Mass Transfer, Vol. 27, No. 4, May 2000, pages 495-506. ΑV Issam Mudawar et al., "Enhancement of Critical Heat Flux from High Power Microelectronic Heat Sources in a Flow Channel", Journal of Electronic Packaging, September 1990, Vol. 112, pages 241-248. AW 🗹 Nelson Kuan, "Experimental Evaluation of Micro Heat Exchangers Fabricated in Silicon", 1996, HTD-Vol. 331, National Heat Transfer Conference, Vol. 9, pages 131-136. ΑX E. W. Kreutz et al., "Simulation of micro-channel heat sinks for optoelectronic microsystems", Microelectronics Journal 31(2000) pages 787-790. AY

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OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication)						
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